US009303878B2

(12) **United States Patent**
Burt et al.

(10) **Patent No.: US 9,303,878 B2**
(45) **Date of Patent: Apr. 5, 2016**

(54) **HYBRID RANGE AND METHOD OF USE THEREOF**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 820 days.

(21) Appl. No.: **13/205,994**

(22) Filed: **Aug. 9, 2011**

(65) **Prior Publication Data**

US 2011/0290781 A1 Dec. 1, 2011

Related U.S. Application Data

(63) Continuation-in-part of application No. 12/948,135, filed on Nov. 17, 2010, which is a continuation-in-part of application No. 12/559,597, filed on Sep. 15, 2009, now abandoned.

(60) Provisional application No. 61/097,082, filed on Sep. 15, 2008.

(51) **Int. Cl.**

F24C 3/12	(2006.01)
H02J 3/14	(2006.01)
G06Q 50/06	(2012.01)
H02J 3/00	(2006.01)

(52) **U.S. Cl.**
CPC ***F24C 3/128*** (2013.01)

(58) **Field of Classification Search**
CPC H02J 3/14; H02J 3/382; H02J 3/06; H02J 3/00; H02J 13/0086; Y04S 20/222; Y02B 70/3225; G06Q 50/06; G06G 7/635; H05B 6/6473; F24C 3/128
USPC 700/295, 291, 299, 297, 286; 307/38, 307/39
See application file for complete search history.

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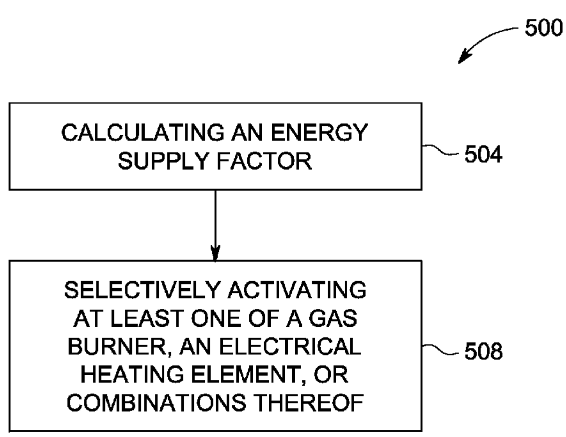
(57) **ABSTRACT**

An appliance includes an oven cavity; a gas burner disposed within the oven cavity; an electrical heating element disposed within the oven cavity; and a controller in operative communication with the gas burner and the electrical heating element, the controller being configured to receive a signal indicative of a current state of an associated utility, and to selectively activate at least one of the gas burner and the electrical heating element based upon the signal.

17 Claims, 4 Drawing Sheets



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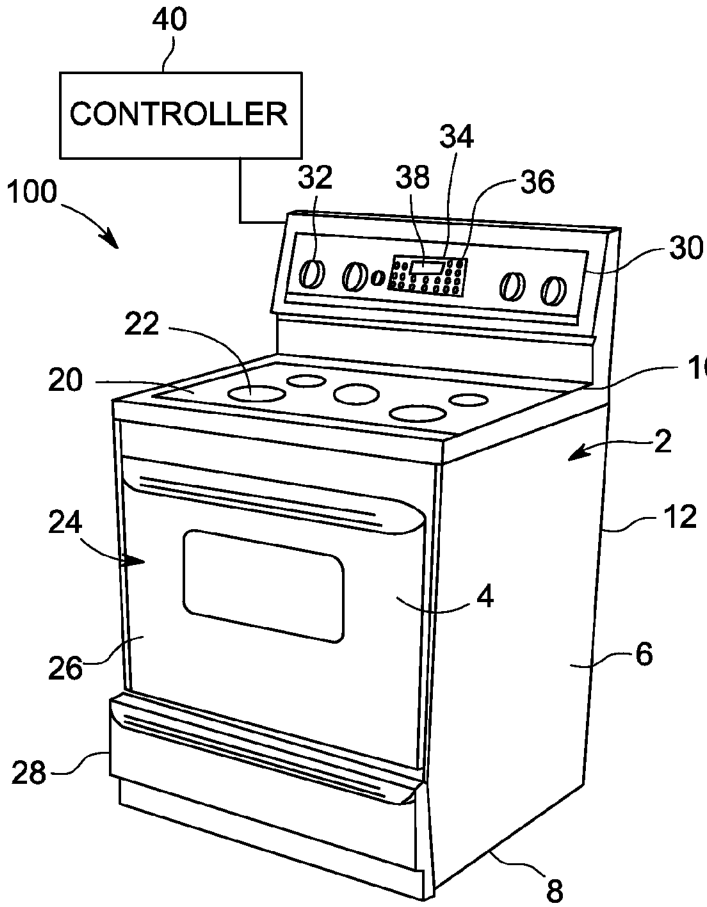
40
CONTROLLER
100
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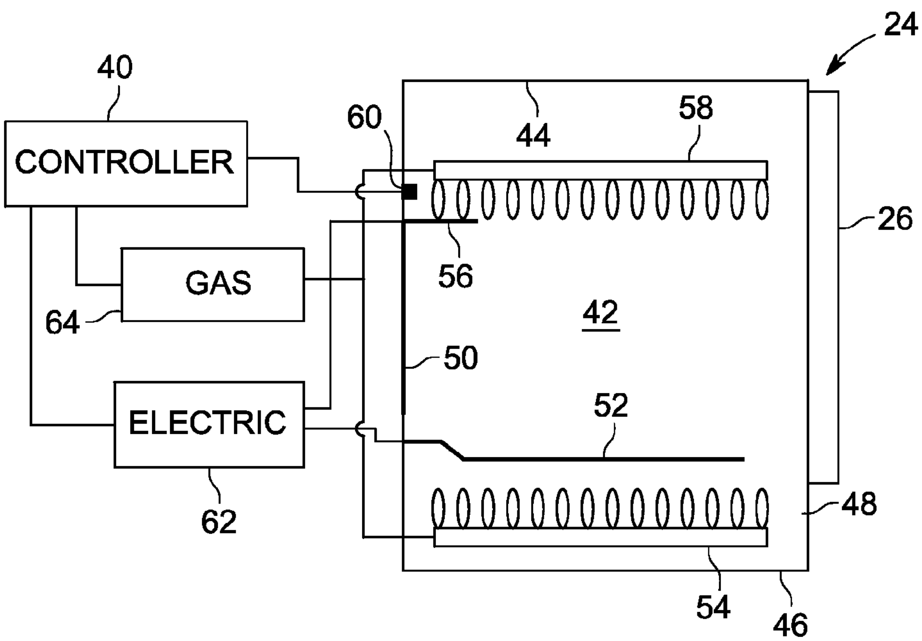
2
24
12
4
26
6
28
8

FIG. 1


24
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GAS
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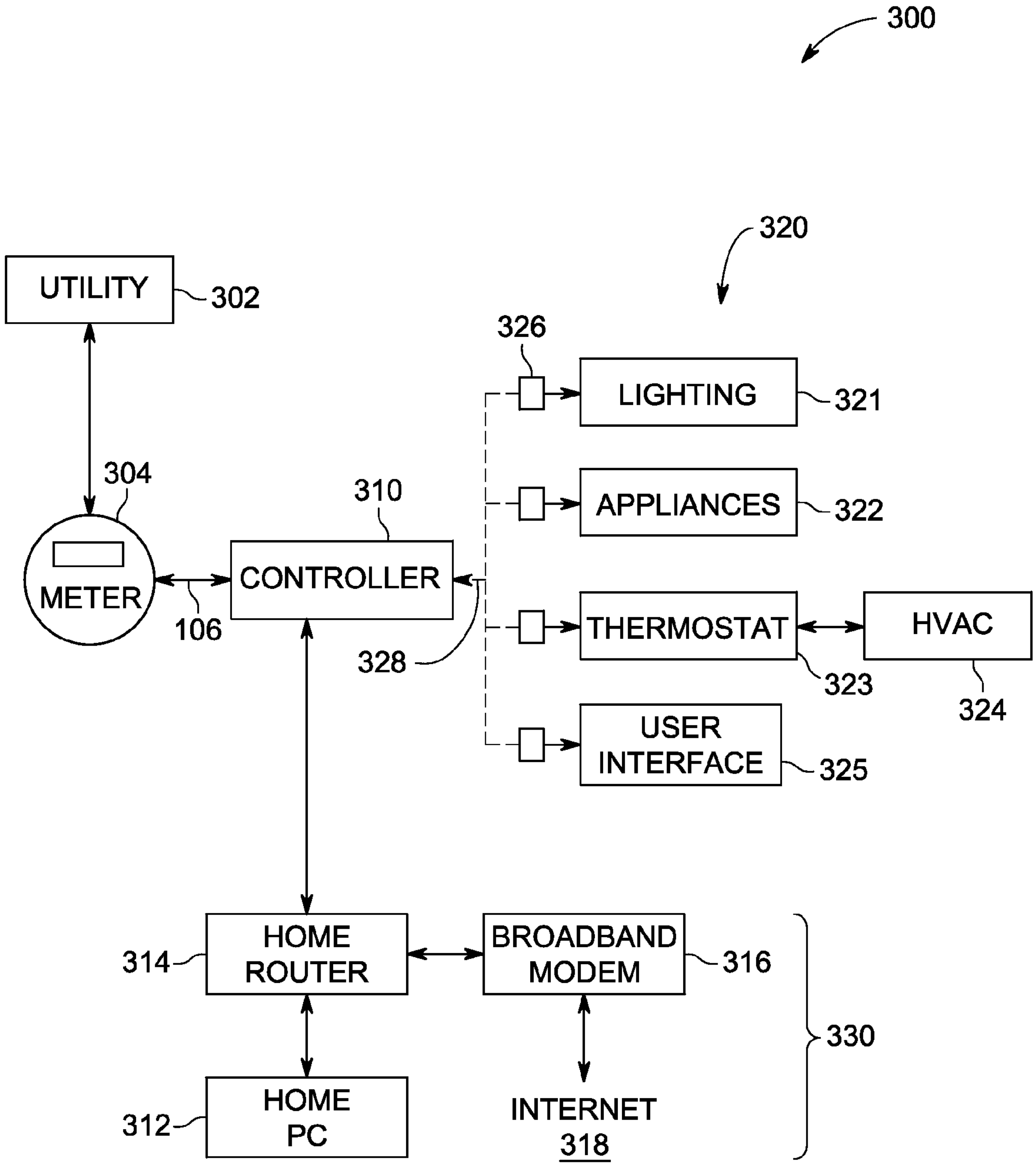
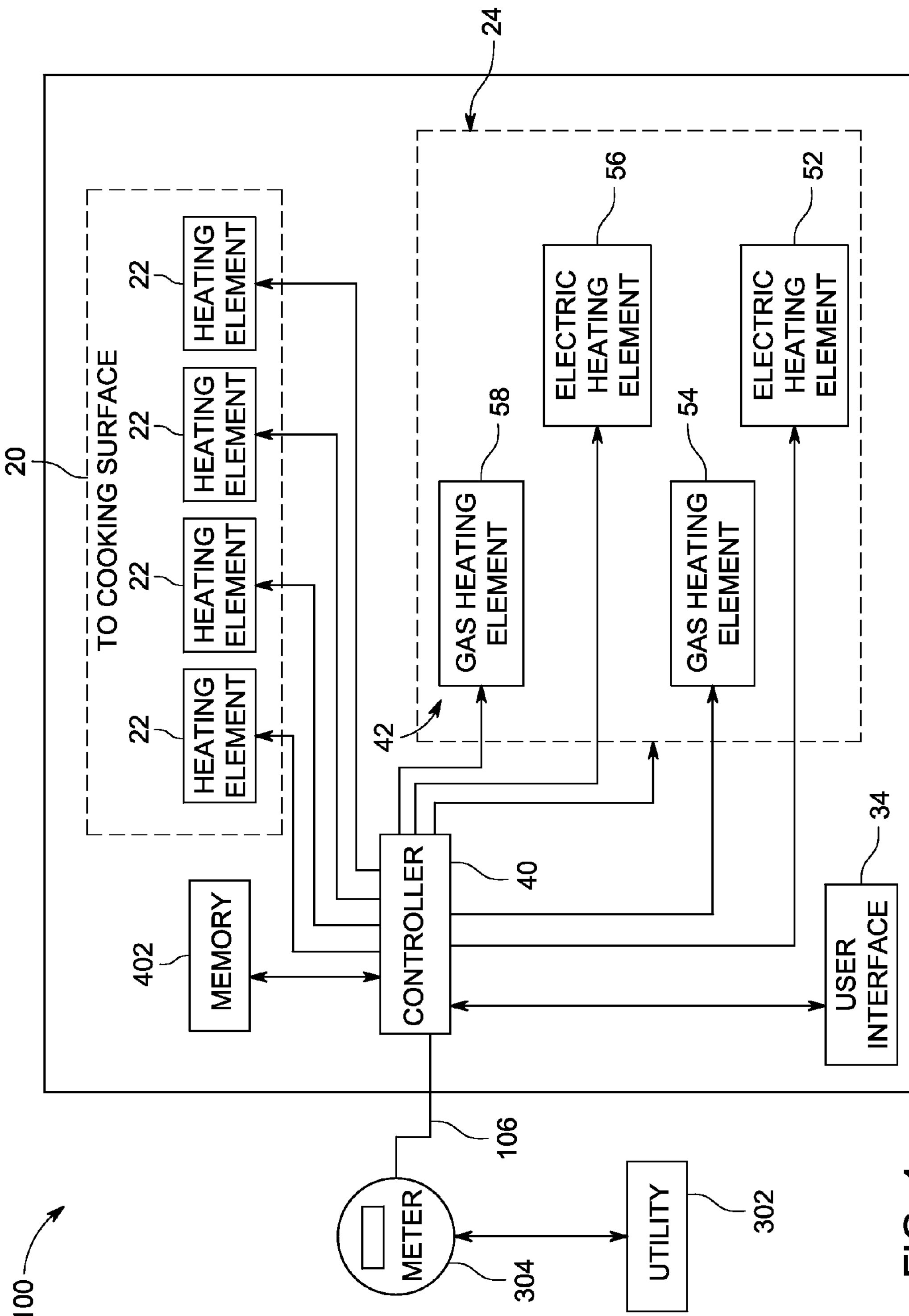
ELECTRIC
52
62
48
54
46

FIG. 2



300
320
UTILITY
302
326
LIGHTING
321
304
310
APPLIANCES
322
METER
CONTROLLER
THERMOSTAT
HVAC
106
328
323
324
USER INTERFACE
325
HOME ROUTER
314
BROADBAND MODEM
316
330
HOME PC
312
INTERNET 318

FIG. 3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TO COOKING SURFACE
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HEATING ELEMENT
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HEATING ELEMENT
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HEATING ELEMENT
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HEATING ELEMENT
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ELECTRIC HEATING ELEMENT
52
ELECTRIC HEATING ELEMENT
58
GAS HEATING ELEMENT
54
GAS HEATING ELEMENT
42
402
MEMORY
CONTROLLER
40
34
USER INTERFACE
106
METER
304
UTILITY
302
100

FIG. 4

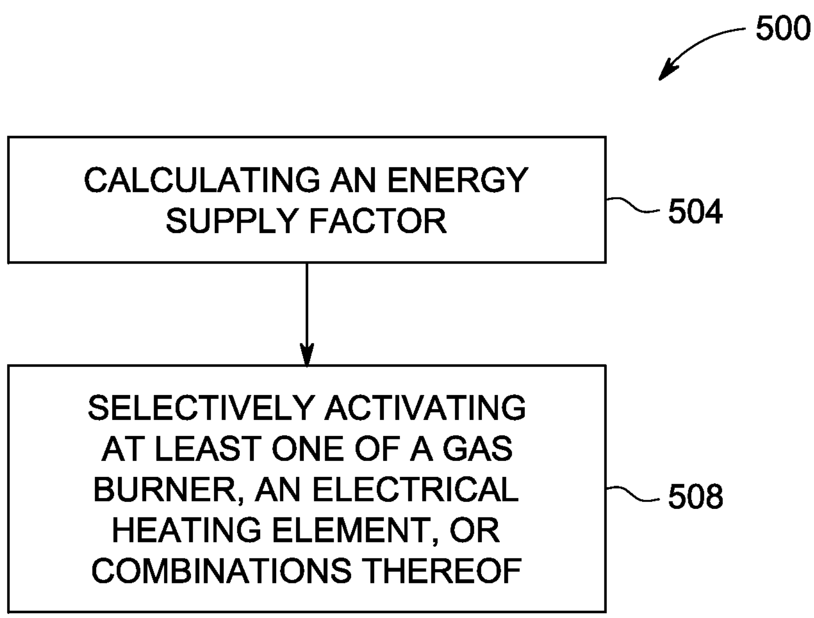
500
CALCULATING AN ENERGY SUPPLY FACTOR
504
SELECTIVELY ACTIVATING AT LEAST ONE OF A GAS BURNER, AN ELECTRICAL HEATING ELEMENT, OR COMBINATIONS THEREOF
508

FIG. 5

HYBRID RANGE AND METHOD OF USE THEREOF

CROSS REFERENCE TO RELATED APPLICATIONS

The present application is a Continuation-in-Part of U.S. patent application Ser. No. 12/948,135, filed Nov. 17, 2010, which is incorporated herein by reference and is in turn a Continuation-in-Part of U.S. patent application Ser. No. 12/559,597, filed Sep. 15, 2009, now abandoned, which is incorporated herein by reference and claims priority from U.S. Provisional Patent Application Ser. No. 61/097,082, filed Sep. 15, 2008, which is incorporated herein by reference.

BACKGROUND

The present disclosure generally relates to energy management of household consumer appliances, and more particularly to energy management in hybrid cooking appliances.

Utilities typically charge a flat rate for energy consumption, but with the increasing cost of fuel prices and high energy usage at certain parts of the day, generally referred to herein as "peak demand" or "peak demand periods", utilities have to buy more energy to supply customers during these peak demand periods. Consequently, utilities tend to charge higher rates during peak demand periods. If demand during peak periods can be lowered, then a potential cost savings can be achieved and the load that the utility has to accommodate during peak demand periods is lessened.

One proposed solution is to provide a system where a controller "switches" the actual energy supply to the appliance or control unit on and off. However, there is no active control beyond the mere on/off switching. Another method involves demand side management (DSM), where a control device in an electromechanical appliance can delay, adjust or disable power consuming features to reduce power consumption. However, such DSM devices simply switch off or reduce loads without any feedback regarding the loads in use.

Electrical utilities moving to an Advanced Metering Infrastructure (AMI) system will need to communicate to appliances, HVAC, water heaters, ranges, etc. in a home or office building. In these types of advanced systems, the utility can transmit a signal to appliances employing "smart" metering devices or systems to indicate periods of peak demand. These "smart" devices can then employ various load shedding processes to reduce the demand on the utility or grid.

As described above, various factors can influence the relative costs associated with use of different types of heating elements, such as electric or gas. It would be advantageous to be able to switch between different energy sources during peak demand periods or when one energy source is less costly than another. Accordingly, it would be desirable to provide a cooking appliance that overcomes at least some of the problems identified above.

BRIEF DESCRIPTION OF THE DISCLOSED EMBODIMENTS

As described herein, the exemplary embodiments overcome one or more of the above or other disadvantages known in the art.

One aspect of the disclosed embodiments relates to an appliance. The appliance includes a controller and an oven cavity with a gas burner and an electrical heating element mounted therein. The controller is in operative communication with the gas burner and the electrical heating element. The controller is configured to receive a signal indicative of a current state of an associated utility, and to selectively activate at least one of the gas burner and the electrical heating element based upon the signal.

Another aspect of the disclosed embodiments relates to an oven. The oven includes a controller and an oven cavity with a gas burner and an electrical heating element disposed therein. The controller is in operative communication with the gas burner and the electrical heating element. The controller is configured to calculate an energy supply factor, and to selectively activate at least one of the gas burner and the electrical heating element based upon the energy supply factor.

Another aspect of the disclosed embodiments relates to a method of operating an oven having a controller and an oven cavity with a gas burner and an electrical heating element mounted therein and in operative communication with the controller. The method includes calculating an energy supply factor at the controller, and in response to the calculated energy supply factor, selectively activating at least one of the gas burner and the electrical heating element.

These and other aspects and advantages of the exemplary embodiments will become apparent from the following detailed description considered in conjunction with the accompanying drawings. It is to be understood, however, that the drawings are designed solely for purposes of illustration and not as a definition of the limits of the invention, for which reference should be made to the appended claims. Moreover, the drawings are not necessarily drawn to scale and unless otherwise indicated, they are merely intended to conceptually illustrate the structures and procedures described herein. In addition, any suitable size, shape or type of elements or materials could be used.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. **1** depicts a front perspective view of a range in accordance with an embodiment of the present disclosure;

FIG. **2** depicts a schematic cross-sectional view of a portion of dual fuel oven unit in accordance with an embodiment of the present disclosure;

FIG. **3** depicts a schematic diagram of an energy management system in accordance with an embodiment of the present disclosure;

FIG. **4** depicts a schematic illustration of the demand managed cooking appliance shown in FIG. **1** in accordance with an embodiment of the present disclosure; and

FIG. **5** depicts a flowchart of an exemplary process in accordance with an embodiment of the present disclosure.

DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENTS OF THE DISCLOSURE

Referring to FIG. **1**, an exemplary appliance, such as a free standing range, incorporating aspects of the disclosed embodiments, is generally designated by reference numeral **100**. The aspects of the disclosed embodiments are generally directed to selective activation of oven heating units, powered by different energy sources, to optimize oven performance and minimize energy usage during peak demand periods in a hybrid cooking appliance that incorporates both electric and gas powered heating assemblies. In a hybrid oven including both electric and gas powered heating assemblies, a normal state of the hybrid oven may be to operate using the electrical heating elements. However, in a period of peak demand, or when it is economically less efficient to utilize electrical power, the aspects of the disclosed embodiments will automatically switch the source of power to the hybrid oven from electric to gas, while maintaining the oven performance. Although the aspects of the disclosed embodiments will be described herein with respect to a range, the aspects of the disclosed embodiments can be generally applied to any appliance that is capable of utilizing multiple energy sources, such as refrigerators, air conditioning systems and hot water heaters, for example.

As is shown in FIG. **1**, the range **100** includes a cabinet or housing **2** that has a front portion **4**, opposing side panels **6**, a base or bottom portion **8**, a top portion **10**, and a back panel **12**. In the embodiment shown in FIG. **1**, the top portion **10** of the range **100** includes a cooktop **20** having one or more surface heating elements **22**. Heating elements **22** may be electrical or natural gas heating elements, as will be appreciated by one of skill in the art. In alternate embodiments, the range **100** does not include a cooktop **20**, such as in the case of a wall oven.

The range **100** also includes an oven unit **24**. Although the aspects of the disclosed embodiments are described herein with respect to the single oven configuration shown in FIG. **1**, in alternate embodiments, the range **100** could comprise a multiple oven unit. As shown in the example of FIG. **1**, the range **100** includes an oven door **26** and a pullout drawer **28**, the operation of which is generally understood.

In one embodiment, the cabinet **2** of the range **100** includes a control surface **30** that supports one or more controls, generally referred to herein as burner control(s) **32**. The burner control(s) or control knob(s) **32** shown in FIG. **1** are generally in the form of a knob style control that extends outwardly from and can be supported by the control surface **30**, which in one embodiment comprises a backsplash. In alternate embodiments, the knob(s) **32** can comprise any suitable switch or control device. In one embodiment, a control panel **34** includes a plurality of input selectors or switches **36** and a display **38** cooperating with control knob(s) **32** to form a user interface for selecting and displaying cooking cycles, warming cycles and/or other operating features, including selection of heating units within the oven unit **24**. In one embodiment, the input selectors or controls **36** can be in the form of push buttons or electronic switches.

In one embodiment, the range **100** includes a controller, such as controller **40** described herein. The controller **40** can be coupled to, or integrated within, the control panel **34** and configured to receive inputs and commands from, for example, the controls **32** and **36**, as well as external sources, and control the various operations and functions of the oven **100**, including the switching of the power source, as will be further described herein. In one embodiment, the controller **40** can include an electronic range control, and can be used to selectively activate heating elements within the oven unit **24**, based upon an energy supply factor characteristic of the utility state and/or supplied energy, e.g., electricity demand and/or availability, as is described herein.

FIG. **2** is a schematic cross-sectional view of a portion of a dual fuel oven unit **24** that can be used with range **100** (shown in FIG. **1**). Oven unit **24** includes an oven cavity **42** that is generally defined by a top wall **44**, a bottom wall **46**, two side walls **48**, and a back wall **50**. Front-opening access door **26** is hinged on one of side walls **48** and covers the front opening (not shown) of oven cavity **42** in the closed position.

In an exemplary embodiment, oven unit **24** includes a lower electrical heating element **52**, also referred to as a bake element, and a lower gas burner **54**, also referred to as a bake burner. The lower electrical heating element **52** and lower gas burner **54** are disposed in the lower portion of oven cavity **42**, typically attached to or above the bottom wall **46**. In one embodiment, the oven unit **24** can also include one or both of an upper electrical heating element **56**, also referred to as a broil element, and an upper gas burner **58**, also referred to as a broil burner. The upper electrical heating element **56** and upper gas burner **58** are disposed in an upper portion of oven cavity **42**, typically attached to or below the top wall **44**.

Oven unit **24** also includes a temperature sensor or probe **60** that extends at least partially into oven cavity **42**. The temperature sensor **60** is in signal communication with controller **40** in order to maintain a set temperature of the oven cavity **42** by modulating one or more of the heating elements **52-58**, as is generally understood in the art.

The electrically operated lower element **52** and upper element **56** are typically coupled to an electrical power supply **62**, such as a 120 volt power supply or a 240 volt power supply, for example, in a suitable fashion. The gas operated lower burner **54** and upper burner **58** are coupled to a gas supply **64**, also in a fashion that is generally understood.

In one embodiment, each of the electrical power supply **62** and the gas supply **64** are communicatively coupled to the controller **40**. The controller **40** is configured to regulate the supply of, to switch between, the gas or electrical power to respective electrical heating elements **52**, **56** and gas burners **54**, **58** in the oven unit **24** in a manner as described herein. The electrical supply **62** will include suitable relays, switches or other controls for controlling the supply of electrical power to the elements **52**, **56**, as will be understood in the art, while the gas supply **64** will include suitable valves and switches for controlling the gas flow to the burners **54**, **58**, as will be understood in the art.

Referring to FIG. **3**, the aspects of the disclosed embodiments allow the use of an advanced system **300** to handle energy management between the utility **302** and the homeowner's appliances **320**, also referred to herein as "smart" or "intelligent" appliances. In one embodiment, the system **300** can include one or more of a controller **310**, utility meter **304**, communication network **328**, intelligent appliances **320**, and a home network **330**. Less advanced systems may allow for direct communication between the appliances **320** and the utility meter **304**, or mesh the network **328** through a DSMM (Demand Side Management Module). In one embodiment, the controller **310** is a DSM Module, which receives information from either the utility **302** via a smart meter or the internet or a home pc via home router **314**.

The home network **330** is generally a computer system that is coupled to the utility **302**, either through the meter **304** or via an Internet connection **318**, for example, that allows the utility to notify the controller **310** when the utility is in peak demand. In the embodiment shown in FIG. **3**, the home network **330** includes a computer **312** coupled to the Internet **318** via a router **314** and modem **316**. In alternate embodiments, the home network **330** can be configured to receive information from the utility **302** in any suitable manner over any suitable communication network, including for example, a telecommunication network.

In one embodiment, the utility **302** provides the controller **310** with a signal **106** that is indicative of the occurrence of peak demand, also herein referred to as an energy supply factor. In one embodiment, the signal **106** is generated by the utility **302** to indicate a period of peak demand. Additionally, the homeowner can select a power source based on the rate the utility is charging, for example, at different times of the day. The controller **310** can also evaluate the energy consumption used by the home via the utility meter **304** at a specific point in time and determine if the home is exceeding a demand limit that is set by the utility or homeowner. If the demand limit is exceeded, the controller **310** can control the appliances **320** in a suitable manner.

As shown in FIG. **3**, each intelligent appliance **320** has or is coupled to a communication interface **326** that is communicatively linked to the controller **310** via the network **328**, or other suitable communication means. Although the communication interface **326** is shown as a separate device for each intelligent appliance **320**, in one embodiment, the communication interface **326** is a single unit shared by the different appliances **321-324**. The communication interface **326** can be a power-line carrier receptive of data via electrical power transmission lines, a wireless device, and/or a wired communication interface that allows the transfer and exchange of data and information between each of the intelligent appliances **320** and the controller **310**. The controller **310** will communicate with, and control, the lighting **321**, appliances **322**, and thermostat **323** (for HVAC **324**), to execute the user's preferences/settings. In one embodiment, the user inputs the settings and preferences via the user interface **325**. The user interface **325** can comprise, be part of, or communicatively coupled to the user interface **34** described with respect to FIG. **1**. The appliances **322** shown in FIG. **3** can generally include the appliance **100** illustrated in FIG. **1**.

In the system **300** of FIG. **3**, the intelligent appliances **320** respond to, or are controlled by, the signal **106** from the utility meter **304** to lower the peak load on the utility **302** and reduce the amount of energy that the consumer uses during peak energy demand periods. The signal **106** may generated by the utility provider **302**, such as a power company, and can be transmitted via a power transmission line, as a radio frequency signal, or by any other means for transmitting a signal when the utility provider **302** desires to reduce demand for its resources. Other suitable methods are described in U.S. patent application Ser. No. 12/559, 597.

FIG. **4** is a schematic illustration of the demand managed cooking appliance **100** shown in FIG. **1**. As noted, the appliance **100** includes one or more power consuming features/functions, such as the surface heating elements **22**, electric oven heating elements **52**, **56** and oven gas burners **54**, **58**. The controller **40**, which in one embodiment is part of, or communicatively coupled to the controller **310** of FIG. **3**, is operatively connected to each of the heating elements **22**, the lower and upper electrical heating elements **52**, **56** and the lower and upper gas burners **54**, **58**. The controller **40** can also be coupled to a memory unit **402** and the user interface **325** of FIG. **3**. In one embodiment, the controller **40** includes a microcomputer(s) or processor(s) on a printed circuit board which is programmed to selectively control the source of power to the oven unit **24** in accordance with the aspects of the disclosed embodiments described herein.

In the embodiment of FIG. **4**, the controller **40** is configured to receive and process the signal **106**. The signal **106** is received from the utility meter **304**. Alternatively, the signal **106** can be received directly from the utility **302**. The signal **106** can be indicative of the state of the demand, or a supply factor, for the utility's energy. For example, a relatively high price may be associated with a peak demand state or period, and a relative low price or cost is typically associated with an off-peak demand state or period.

The controller **40** can operate the appliance **100** in one of a plurality of operating modes, including a normal operating mode and an energy savings mode. In one embodiment, the controller **40** can switch between the normal operating mode and the energy savings mode in response to the received signal **106**. Specifically, the appliance **100** can be switched to operate in the energy savings mode in response to a state of signal **106** that indicates a peak demand state or period. For purposes of the description herein, the energy savings mode is a mode where the source of energy being used to power the oven cavity **24** is switched from an energy source that is subject to peak demand, such as electrical power, to an energy source that is not subject to peak demand constraints, such as natural gas. As will be discussed in greater detail below, the controller **40** is configured to selectively switch between the consumption of electrical energy or gas to reduce consumption of peak demand power by the cooking appliance **100** in the energy savings mode.

The controller **40** is responsive to the utility state to selectively activate operational aspects of the appliance **100**. For example, in one scenario during a peak demand period, the controller **40** will receive a signal **106** from the utility **302**, home network **330**, or user interface **325** that indicates the appliance **100** or system **300** has exceeded a demand limit. Responsive to the signal **106**, the controller **40** allocates, or switches the power source to appliance **100** based on two factors. A priority dictates which appliances **321-324** have higher priority to be in full energy mode than other appliances. Energy need dictates how much energy is required in a certain time period in order for each appliance to function properly. If an appliance's energy need to function properly exceeds the energy available in the energy saving mode, the appliance moves to a normal mode. The energy saving mode is typically a lower energy usage mode for the appliance such as shutdowns of compressors and motors, delayed cycles, higher operating temperatures in summer, lower operating temperatures in winter until the peak demand period is over, or use of an alternate available energy source. Once the demand limit is reached, the appliances will begin to transition into energy saving mode based on the priority and energy need level. The controller **40** receives periodic status updates from the utility **302** and appliances **321-324** in order to determine the appropriate mode of operation and if priorities need to change to maintain operation of the system **300** beneath the demand limit.

If the controller **40** receives and processes signal **106** indicative of a peak demand period or that the peak demand limit has been exceeded, the controller **40** determines whether one or more of the power consuming features/functions should be operated in the energy savings mode and if so, it signals the appropriate features/functions of the appliance **100** to begin operating in the energy savings mode to reduce the instantaneous peak energy demand by the appliance. For example, it has been observed that use of electrical power to heat an oven, such as oven cavity **42** of range **100** provides generally preferred temperature control. Accordingly, in one embodiment, the range **100** may operate in the normal mode using electrical heating elements **52**, **56** and transition to use of gas burners **54**, **58** in the energy savings mode.

In response to determination of a peak energy demand or that a peak demand limit has been exceeded, the controller **40** may transition the oven from normal to energy savings mode. In an exemplary embodiment, the controller **40** is responsive to the signal **106** to determine that the peak demand limit has been reached and selectively activates the gas burners **54**, **48** to initiate a transition from use of the electric heating elements **52**, **56** to gas burners **54**, **58** to heat the oven cavity **42**. The transition from the use of electric heating elements **52**, **56** to gas burners **54**, **58** is temperature based, and therefore controlled in a manner to maintain an appropriate cooking temperature within oven cavity **42**.

The controller **40** is responsive to determination that the peak demand limit has been exceeded during a cooking operation to regulate a decrease in electricity, via electrical supply **62** to the electrical heating elements **52**, **56** and an increase in natural gas, via supply **64** to the gas burners **54**, **58**. Heat to maintain the desired temperature in the oven is supplied by duty cycle control of the heat source. In one embodiment the transition from electricity to gas involves simply switching from duty cycling the electric element or elements to duty cycling the gas burner or burners, as necessary to maintain the desired oven temperature. It is also contemplated that the temperature based transition may include a temporary overlap of energy supply from both electrical and gas energy via supplies **62**, **64**. For example, the electrical heating elements **52**, **54** may initially operate at reduced power while the gas burners **54**, **58** begin to affect the heating of the oven cavity **42**. As the gas burners **54**, **58** increase their contribution of heating the oven cavity **42**; the electrical heating elements **52**, **54** may be turned off to reduce power consumption beneath the peak demand limit. In this manner, the temperature based transition maintains proper cooking temperature within the oven cavity **42** during the transition from normal (electric) to energy savings (natural gas) mode. In some embodiments, the power consumption may be reduced beneath the peak demand limit by increasing the energy provided by gas supply **64** and reducing the electrical supply **62** without necessarily fully deactivating the electrical heating elements **52**, **54**.

As described above with reference to FIGS. **1** through **3**, the controller **310** receives periodic status updates from the utility **302** and appliances, such as range **100**. The controller **310** determines the present operational mode, and if operation of the system **300** is beneath the demand limit, the controller **310** may require (or allow) a change in operational mode of the appliances. For example, the controller **310** is responsive to a determination that operation of the oven **24** at a desired temperature does not exceed the demand limit to transition to use of electrical power, via energy supplies **62**, **64** to heat the oven. As described above, the transition may be temperature based, and thereby maintain a desired cooking temperature within the oven cavity **42**.

In view of the foregoing, the controller **40** facilitates a method of operating an oven **24**. FIG. **5** depicts a flowchart **500** of exemplary process steps of operating an oven, such as oven **24**. At process step **504**, the controller **40** calculates an energy supply factor, such as to compare a present electricity demand to a peak electrical demand limit. At process step **508**, based upon the energy supply factor calculated at step **504**, the controller **40** selectively activates one or more of the gas burners **54**, **58**, one or more of the electrical heating elements **52**, **56**, or a combination thereof.

In an embodiment, the process step **504** of calculating the energy supply factor may be based upon various inputs, including without limitation, time of day, season of year, geographic location, and relative present demand of natural gas and electricity. In an embodiment, the process step **508** may include selectively activating elements using only one energy source, such as gas burners **54**, **58** or electrical heating elements **52**, **56**.

Embodiments of the process may also include receiving, at the controller **40**, data such as from the Internet **318**. Some embodiments may include a wireless connection to the Internet. Some embodiments may include receiving the data via the electrical power supply **62**, shown in FIG. **2**.

While embodiments of the disclosure have been described as a dual-fuel oven, it will be appreciated that the scope of the disclosure is not so limited and may apply to ranges with other arrangements of heating sources, such as dual-fuel surface heating elements, for example.

As disclosed, some embodiments of the disclosure may include some of the following advantages: an ability to specify an energy supply source used to heat an oven; an ability to calculate an energy supply factor; and an ability to reduce peak energy usage.

An embodiment of the disclosure may be embodied in the form of computer-implemented processes and apparatuses for practicing those processes. Embodiments of the present disclosure may also be embodied in the form of a computer program product having computer program code containing instructions embodied in tangible media, such as floppy diskettes, CD-ROMs, hard drives, USB (universal serial bus) drives, or any other computer readable storage medium, wherein, when the computer program code is loaded into and executed by a computer, the computer becomes an apparatus for practicing the invention. Embodiments of the disclosure also may be embodied in the form of computer program code, for example, whether stored in a storage medium, loaded into and/or executed by a computer, or transmitted over some transmission medium, such as over electrical wiring or cabling, through fiber optics, or via electromagnetic radiation, wherein when the computer program code is loaded into and executed by a computer, the computer becomes an apparatus for practicing aspects of the disclosure. When implemented on a general-purpose microprocessor, the computer program code segments configure the microprocessor to create specific logic circuits. A technical effect of the executable instructions is to calculate an energy supply factor and select an available energy supply source based upon a desired criterion.

Thus, while there have been shown, described and pointed out, fundamental novel features of the invention as applied to the exemplary embodiments thereof, it will be understood that various omissions and substitutions and changes in the form and details of devices illustrated, and in their operation, may be made by those skilled in the art without departing from the spirit of the invention. Moreover, it is expressly intended that all combinations of those elements and/or method steps, which perform substantially the same function in substantially the same way to achieve the same results, are within the scope of the invention. Moreover, it should be recognized that structures and/or elements and/or method steps shown and/or described in connection with any disclosed form or embodiment of the invention may be incorporated in any other disclosed or described or suggested form or embodiment as a general matter of design choice. It is the intention, therefore, to be limited only as indicated by the scope of the claims appended hereto.

What is claimed is:

1. An appliance comprising:
an oven cavity;
a gas burner disposed within the oven cavity;
an electrical heating element disposed within the oven cavity;
a temperature sensor configured to sense a temperature within the oven cavity;
a controller in operative communication with the gas burner and the electrical heating element, the controller being configured to calculate an energy supply factor, the controller further being configured to operate the appliance based on a demand limit and the energy supply factor, wherein the energy supply factor is calculated based on a relative present demand of gas and electricity;
the controller further configured to receive a signal indicative of a current state of an associated utility, and to selectively activate at least one of the gas burner and the

electrical heating element based upon the demand limit, the calculated energy supply factor and the signal;

the controller being further configured to communicate with the temperature sensor to operate the appliance in a transitional mode wherein the oven cavity is heated by both the electrical heating element and the gas burner so that the temperature within the oven cavity is maintained during a transition from a normal mode to an energy savings mode in response to a determination that the demand limit has been exceeded.

2. The appliance of claim **1**, wherein the current state is indicative of a peak electrical demand period; and the controller selectively activates only the gas burner in response to the signal.

3. An oven comprising:

an oven cavity;

a gas burner disposed within the oven cavity;

an electrical heating element disposed within the oven cavity,

a temperature sensor configured to sense a temperature within the oven cavity;

a controller in operative communication with the gas burner and the electrical heating element, the controller being configured operate the oven based on a user selected demand limit and to calculate an energy supply factor, wherein the energy supply factor is calculated based on a relative present demand of gas and electricity; the controller being further configured to selectively activate at least one of the gas burner and the electrical heating element based upon the demand limit and the energy supply factor; the controller being further configured to communicate with the temperature sensor to operate the oven in a transitional mode wherein the oven cavity is heated by both the electrical heating element and the gas burner so that the temperature within the oven cavity is maintained during a transition from a normal mode to an energy savings mode in response to a determination that the demand limit has been exceeded.

4. The oven of claim **3**, wherein the controller selectively activates only the gas burner based upon the energy supply factor.

5. The oven of claim **3**, wherein the energy supply factor is based upon a peak demand limit of electricity.

6. The oven of claim **5**, wherein the energy supply factor is based upon a comparison of a present electrical consumption of the oven to the peak demand limit.

7. The oven of claim **3**, wherein the controller is in signal communication with the Internet.

8. The oven of claim **7**, wherein the controller receives data regarding a peak demand period of electricity via the Internet.

9. The oven of claim **3**, wherein the controller receives data regarding a peak demand period of electricity via a power line carrier.

10. A method of operating an oven comprising a controller, the method comprising:

inputting a demand limit into the controller:

calculating an energy supply factor at the controller, wherein the energy supply factor is calculated based on a relative present demand of gas and electricity;

in response to the input demand limit and the calculated energy supply factor, selectively activating by the controller at least one of a gas burner and an electrical heating element, the gas burner and the electrical heating element being disposed within an oven cavity of the oven and in operative communication with the controller;

measuring, by a temperature sensor, a temperature within the oven cavity; the temperature sensor is in operative communication with the controller; and

operating the oven in a transitional mode including heating the oven cavity with both the electrical heating element and the gas burner so that the temperature within the oven cavity is maintained during a transition from a normal mode to an energy savings mode in response to a determination the demand limit has been exceeded.

11. The method of claim **10**, wherein the selectively activating comprises selectively activating one of the gas burner and the electrical heating element.

12. The method of claim **10**, wherein the energy supply factor is based upon a peak demand limit of electricity.

13. The method of claim **12**, wherein the energy supply factor is based upon a comparison of a present electrical consumption of the oven to the peak demand limit.

14. The method of claim **10**, wherein the calculating comprises receiving data regarding a peak demand period of electricity via the Internet.

15. The method of claim **14**, wherein the receiving comprises receiving the energy supply factor via a wireless connection.

16. The method of claim **10**, wherein the receiving comprises receiving the energy supply factor via a power line carrier.

17. The method of claim **16**, wherein the energy supply factor comprises a peak demand of electricity.

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